San Dimas Equipment Development Center

STATION LIBRARY COPY

SD421.38
S25
1976

U. S. Department of Agriculture, Forest Service

SD 421.38
S25
1976

The Forest Service Equipment Development Center was established in August 1945 in a one-room office and two stalls of a vehicle storage shed in Arcadia, California. Originally called the Arcadia Fire Control Equipment Development Center, its initial staff consisted of one mechanical engineer and a clerk-typist.

Since its inception, demands for the services of the Center have greatly increased. In 1949, the Center's original purpose was broadened to include the development, testing, evaluation, and standardization of equipment and materials for all Forest Service programs.

By 1965 the facilities at Arcadia had been outgrown, and the Center was relocated in San Dimas. The new buildings include a two-story office building and test and laboratory buildings.

STO

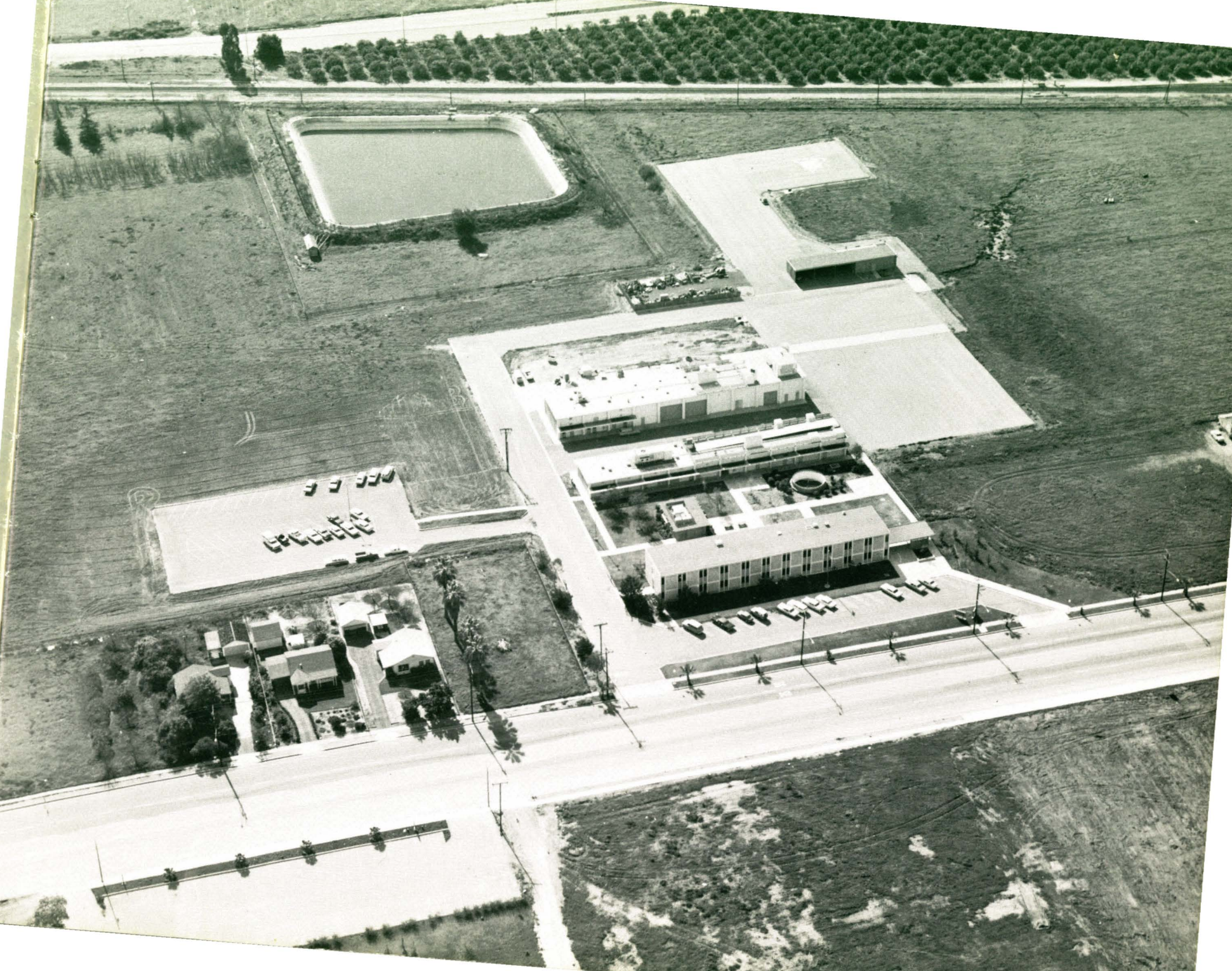
LIBRARY U.S. FOREST SERVICE BERKELEY

SINCE SHORTLY AFTER WORLD WAR II, THE EQUIPMENT DEVELOPMENT AND TEST PROGRAM OF THE FOREST SERVICE HAS PROVIDED SERVICE-WIDE LEADERSHIP IN THE AREAS OF DEVELOPMENT, TESTING, ANALYSIS, STANDARDIZATION, AND EVALUATION OF ALL TYPES OF EQUIPMENT FOR THE PROTECTION AND MANAGEMENT OF FORESTS AND WILDLANDS.

A VARIETY OF EQUIPMENT, FROM THE HUMBLE AXE TO THE MOST SOPHISTICATED MECHANICAL DEVICES, HAS BEEN APPLIED TO THE BROAD OBJECTIVES OF FIGHTING FOREST FIRES, IMPROVING TIMBERLANDS AND RANGELANDS, PRESERVING WILDLIFE, AND PROVIDING RECREATIONAL FACILITIES ON THE NATIONAL FORESTS.

THE DEVELOPMENT CENTER AT SAN DIMAS SERVES AS AN ENGINEERING FACILITY AND A SOURCE OF INFORMATION ABOUT THE MANY COMPLEX PROBLEMS OF FORESTRY EQUIPMENT. SPECIAL EMPHASIS IS GIVEN TO COOPERATION WITH PRIVATE INDUSTRY IN SEEKING NEW EQUIPMENT AND MATERIALS FOR ALL AREAS OF FOREST MANAGEMENT.

STATION LIBRARY COPY



FACILITIES

The facility at San Dimas is the first one completely designed for Forest Service equipment development work. No effort was spared to provide a working environment which would assist the engineers with convenient shop and laboratory aids, and provide a creative, comfortable atmosphere.

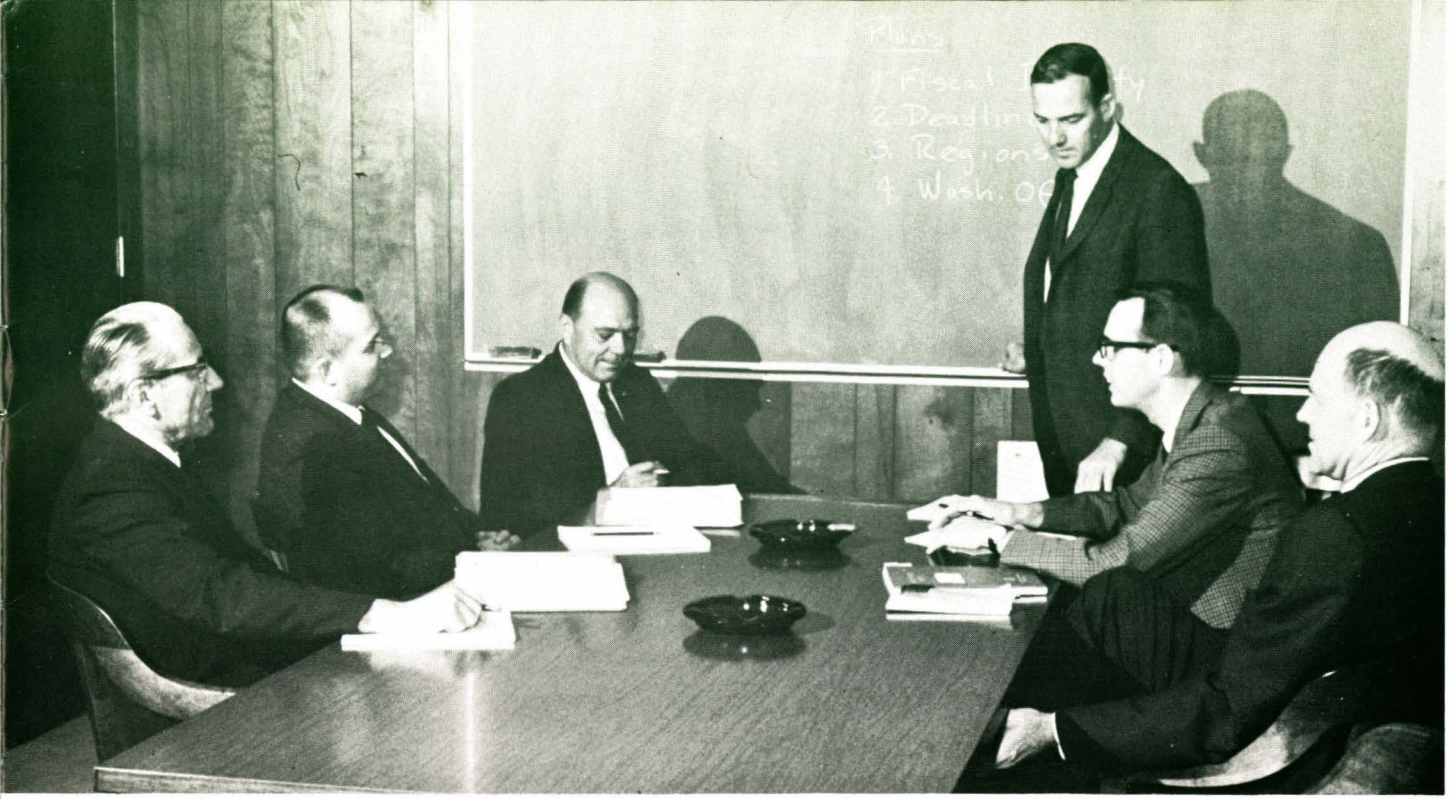
Because of the variety of disciplines involved in the changing demands of forest management technology, a staff of 40-50 people work together to obtain the best solutions to the problems presented.

Approximately half the personnel are graduate engineers. Although most are mechanical engineers, a few are civil, electrical, environmental, and agricultural engineers which provides a balance of disciplines. Any engineer willing to tackle a variety of problems from inception to application would feel at home at the Center. Although specialization is not discouraged, the diversity and broad project assignments require the application of all engineering principles – from fluid mechanics to machine design.

The major advantage of having a relatively small staff is that it allows everyone to participate actively in all phases of a project. Typically, a project engineer will devise his own test program, conduct the tests, and analyze and present his results.

The Equipment Development Program is geared to the needs of the future as well as solving immediate urgent problems.

The facility is equipped with its own lighted, FAA-qualified heliport in order to have direct access to helicopters and VTOL aircraft for project work.



CONFERENCE

Consideration has been given to providing convenient facilities for creative meetings. A small, well-equipped, conference room is located near the staff offices and is available for use by all staff members. Slide and motion picture projection equipment and variable lighting make for productive meetings – both "in-house" and with visiting technical representatives.

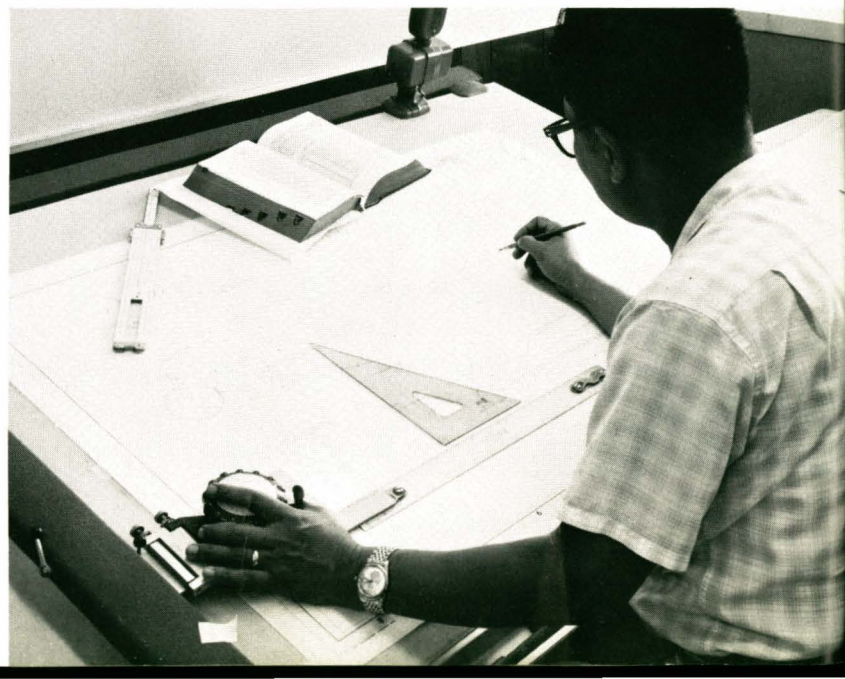
Office facilities have been deliberately designed away from the "bull pen" concept in order to yield as much privacy as practicable, yet retain efficiency.

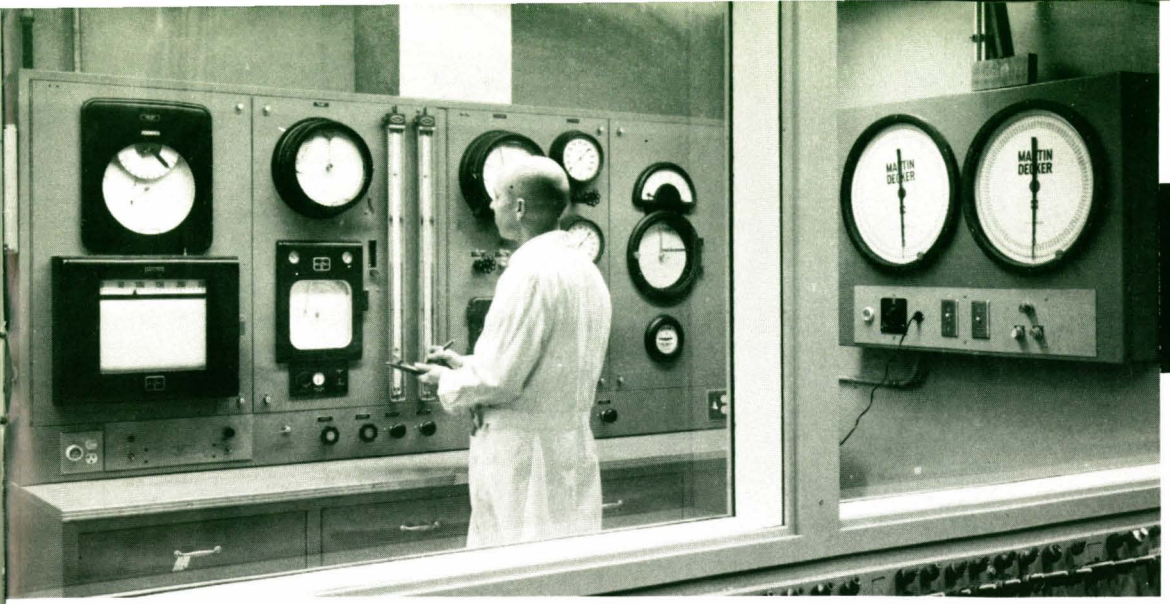
The drawings produced are also used for commercial construction, frequently under contract. In addition, drawings and specifications are provided nationwide to other agencies interested in acquiring special-purpose equipment.

Since one of the major functions of the Center is equipment design, these facilities are spacious, comfortable and are provided with individual modules for efficient working space.

DESIGN

The design section is a service group, working with all other departments of the Center. Its main function is to design and prepare complete drawings and specifications of Forest Service prototype equipment. These can range from the modification of commercially available units, to the design of a totally new piece of machinery. It also includes the redesign work necessary before a prototype is acceptable for Forest Service field use.





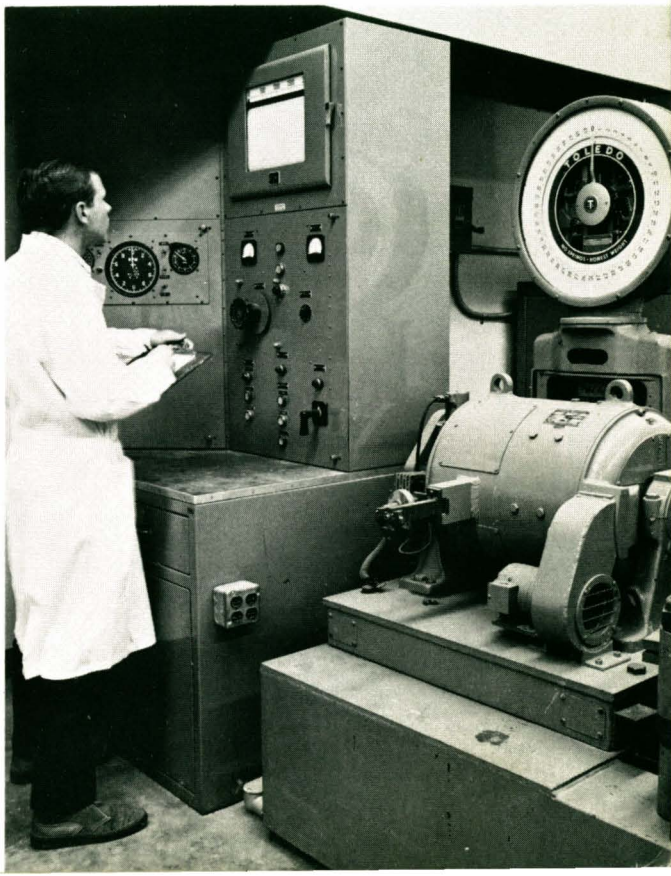
HYDRAULIC TEST & DYNAMOMETER LAB

The functions of the various testing laboratories are many. They work in cooperation with the design and standards sections in qualification and service testing of new Forest Service equipment. The labs help the standards section in determining whether new equipment meets Forest Service requirements. Units that have been conceived by the design section are also frequently tested in the Center's laboratories.

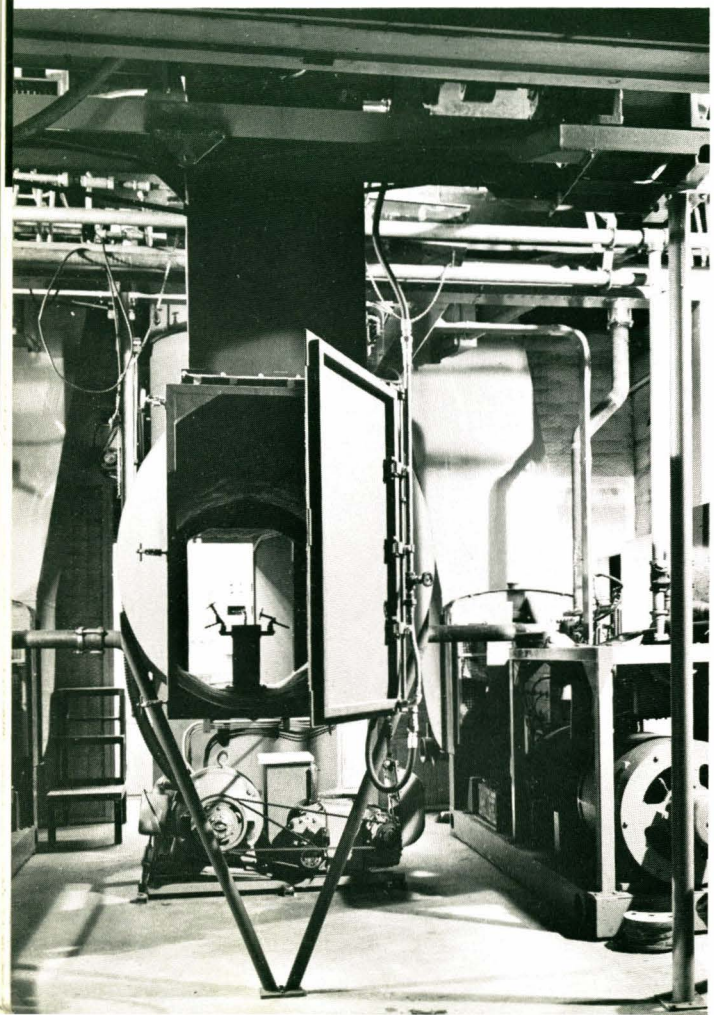
One of the best known testing facilities is the portable fire pumper test cell. The control console remotely monitors a standard 100-hour endurance test required of all fire pumps before they are eligible for Forest Service purchase.

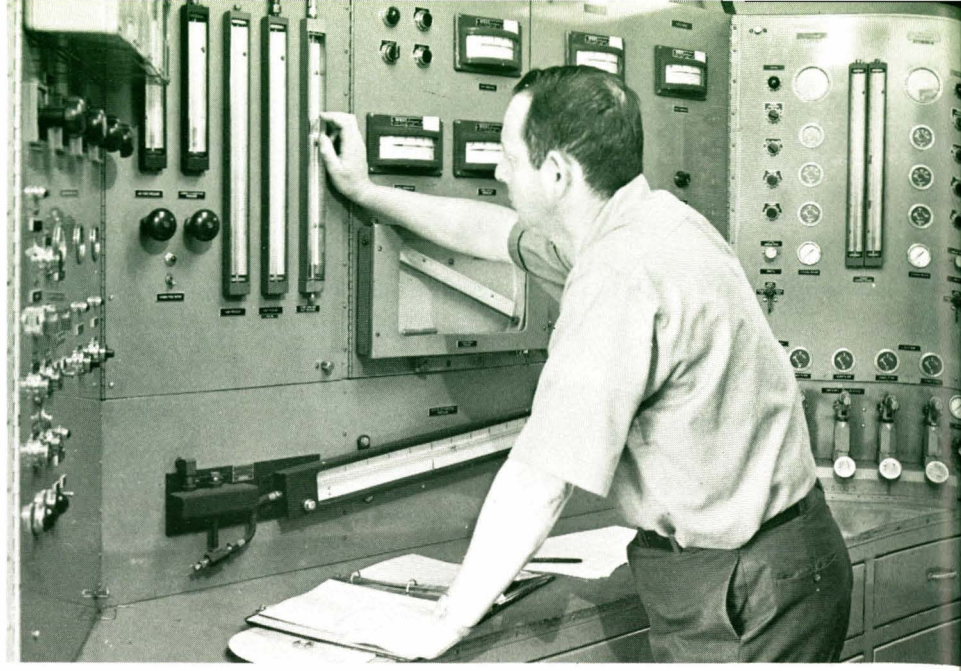
Another useful tool available to Center personnel is the dynamometer laboratory. Illustrated is the electric unit capable of absorbing or driving up to 15 horsepower. This unit has been widely used for checking performance of portable power equipment, as well as for precision power generation when needed for developing and driving small power units such as mixers, chain saws, and pumps.

Included in this facility is a chassis dynamometer for live testing of vehicles under simulated road conditions in the laboratory. This permits controlled testing of engines, fuel systems, exhaust systems, and other components under study.



SPARK ARRESTER



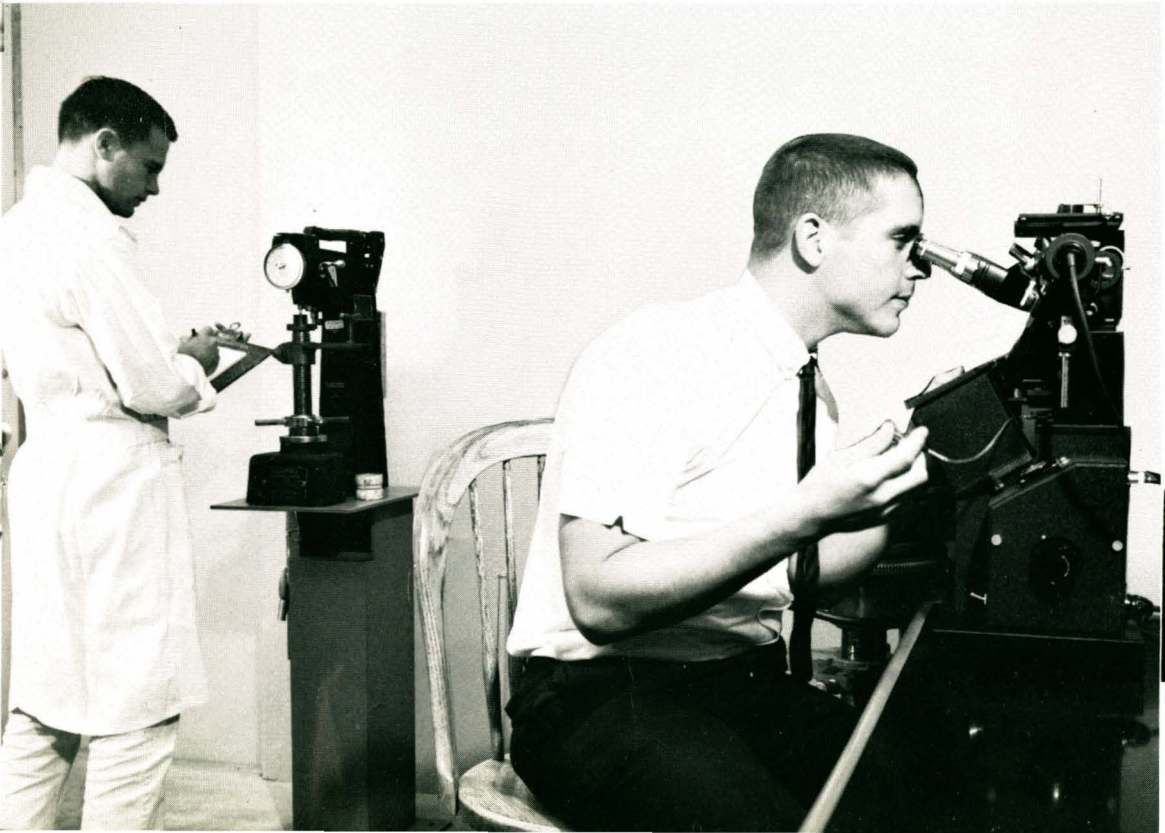


It is a recognized fact that, under some conditions, most internal combustion engines will eject built-up carbon particles through the exhaust system. Since these particles are extremely hot, a fire potential exists. In order to prevent this emission, most forest areas require the use of a spark arrester on the exhaust pipe.

The Center has worked closely with the Society of Automotive Engineers in developing national test codes for the industry as well as the Forest Service. The test facility is also recognized as the most complete and reliable currently available. It can simulate most engine operating conditions and flow ranges required to adequately test all sizes of arresters. This service is provided at cost to any manufacturer requesting qualification of his units. All arresters must meet the test standards set up before eligibility is granted.

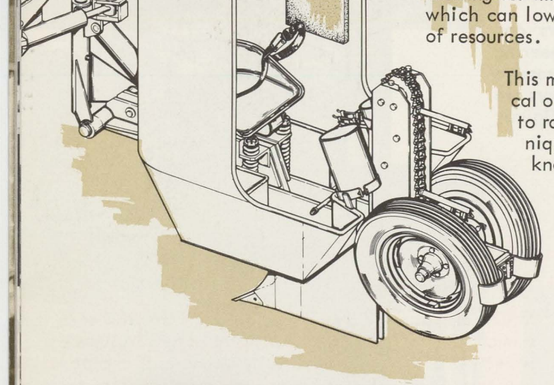
Physical testing, inspection, and design of engineering materials are necessary in an engineering laboratory facility.

Basic equipment and instruments are available to the engineers and technicians of the Center for performing classic physical engineering tests on materials for such qualities as hardness, tensile and compressive strengths, ductility, and crystalline structure. Visual comparators are available for comparing national standard threads and other configuration requirements with actual specimens.



PRECISION TEST

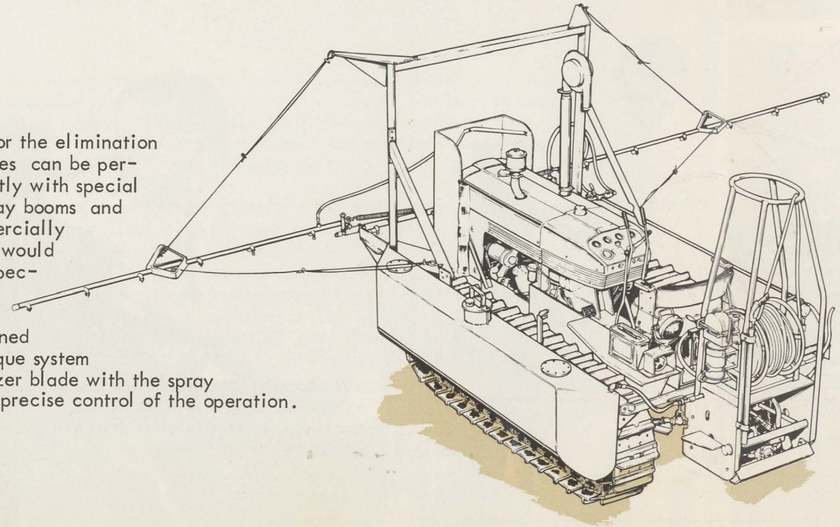
EQUIPMENT



which can lower overall costs of management of resources.

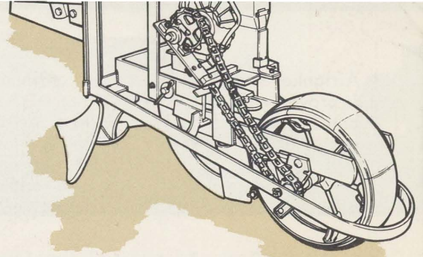
This mechanical tree-planter is typical of a modern engineering approach to radically improve existing techniques or equipment which has had known shortcomings.

Fighting fire from the air has become a reality in the forests. Along with the airtanker, the helicopter has become the "flying pickup" for the firefighter. A device known as the Helicopter Hose Tray, developed by the Center's engineers, can string 1000 feet of fire hose over any terrain in less than a minute.

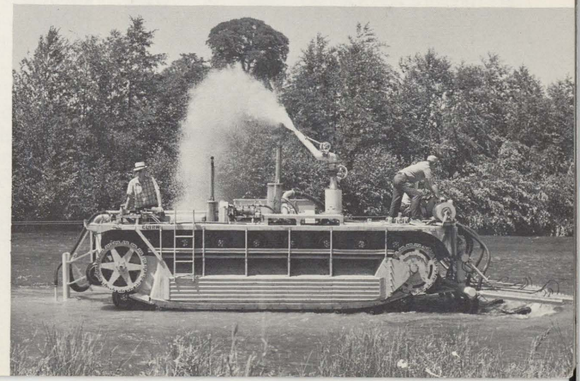


Herbicide spraying for the elimination of undesirable species can be performed more efficiently with special tractor-mounted spray booms and nozzles. No commercially available equipment would meet the stringent specifications of this task. Center engineers have designed and developed a unique system replacing the bulldozer blade with the spray hardware to achieve precise control of the operation.

In addition to ferrying personnel, laying fire hose, and doing other cargo work, the helicopter continues to be exploited for its potential uses in attacking fires.

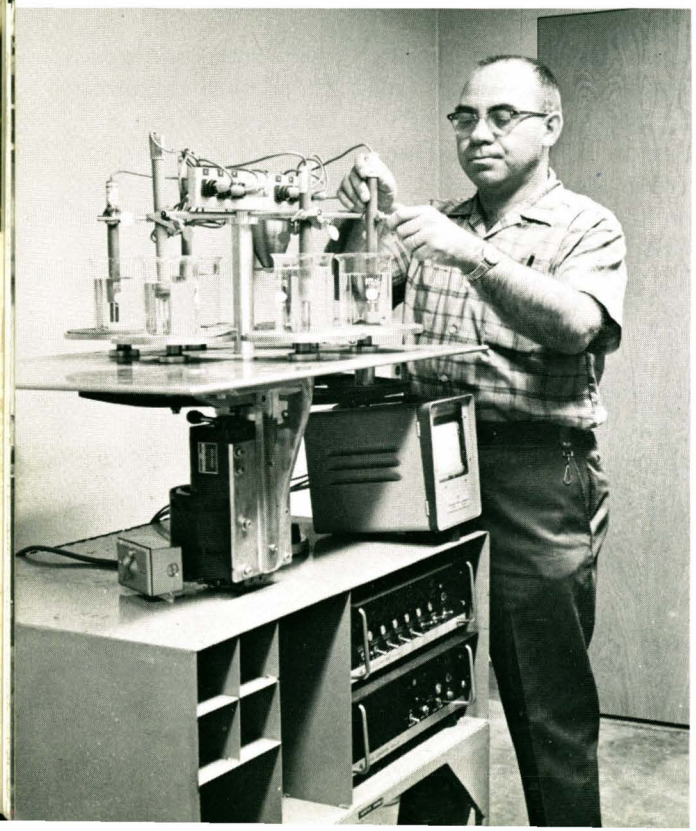


Much of Alaska's National Forest area includes salmon spawning grounds. This rich natural resource is getting boosts in productivity because of the development of a "Riffle Sifter," or gravel cleaner, for use in stream beds. Fish biologists report abundant increases in egg survival when sand and silt are removed from gravel spawning beds.



CORROSION TEST

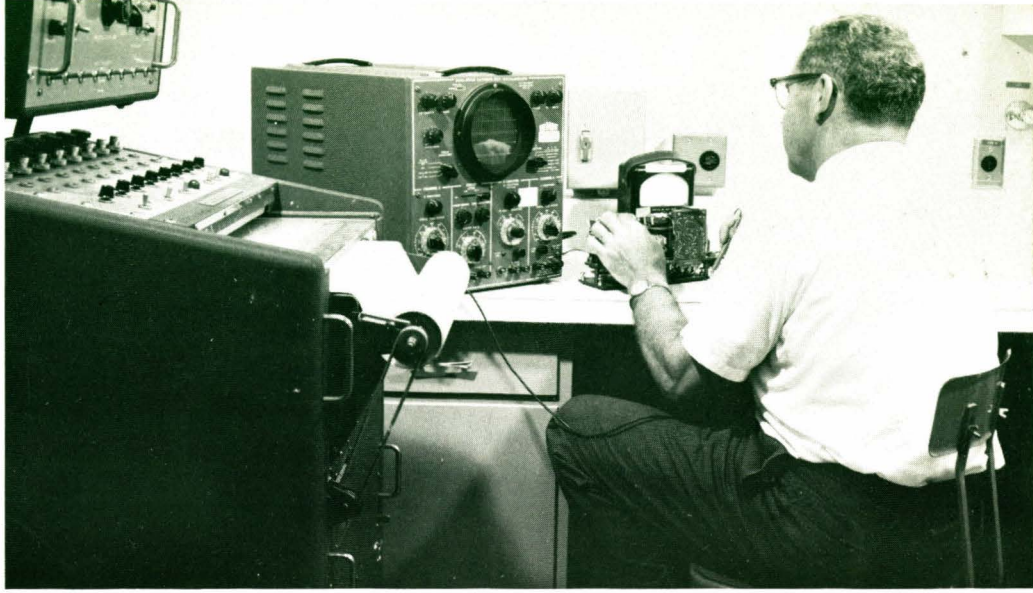
Airtanker attack on forest fires continues to be improved with the advent of newer chemicals and fire retardant materials. In order to insure compatability with existing mixing, pumping and handling equipment, Center engineers conduct exhaustive tests on new formulations before they are released for field use.



An important series of tests are conducted on all retardants to examine their corrosive effects on various metals. Since most fire retardants contain some corrosive chemicals, such effects must be carefully determined to prevent eventual structural failure of aircraft and other equipment. The Center is equipped with metallographic and electronic test equipment to establish these standards objectively and conduct evaluation tests.

Much test work involves the utilization of instruments of various kinds ranging from oscilloscope recorders to sound analyzers. Each test requires a unique combination of measuring equipment in order to provide answers and meaningful data to the engineers.

The modern laboratories contain facilities for assembling, calibrating and utilizing these instruments.

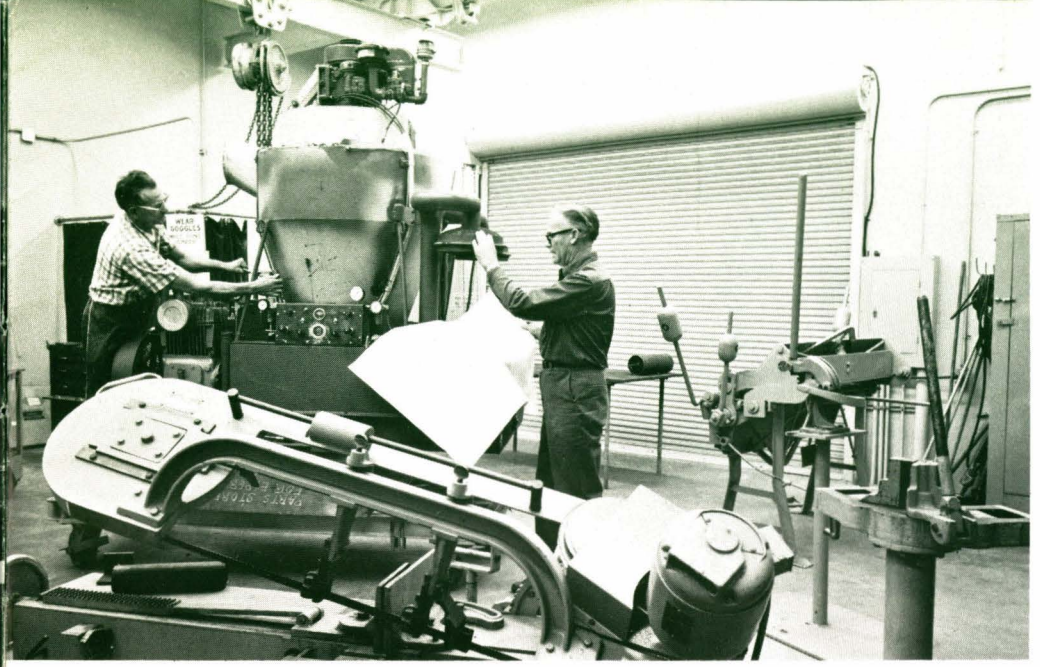


A small, but well-equipped chemistry laboratory provides analysis and small scale measurements of materials when the need arises. No effort has been spared to provide efficient and pleasant working facilities and surroundings for modern engineering development and test work.

ELECTRONIC & CHEMICAL LAB

ENVIRONMENTAL CHAMBER

A unique capability at the Center is the availability of a walk-in environmental chamber. This structure, which was custom designed and installed while the laboratory was being built, provides a versatile indoor proving ground. It can provide an entire range of climatic conditions from -40° F to 200° F and 10 percent relative humidity to 4 inches of rain per hour. Engines, hand tools, conditioning of fire hose, and many other items which are subjected to the rigors of outdoor performance can be checked under controlled conditions within this chamber.

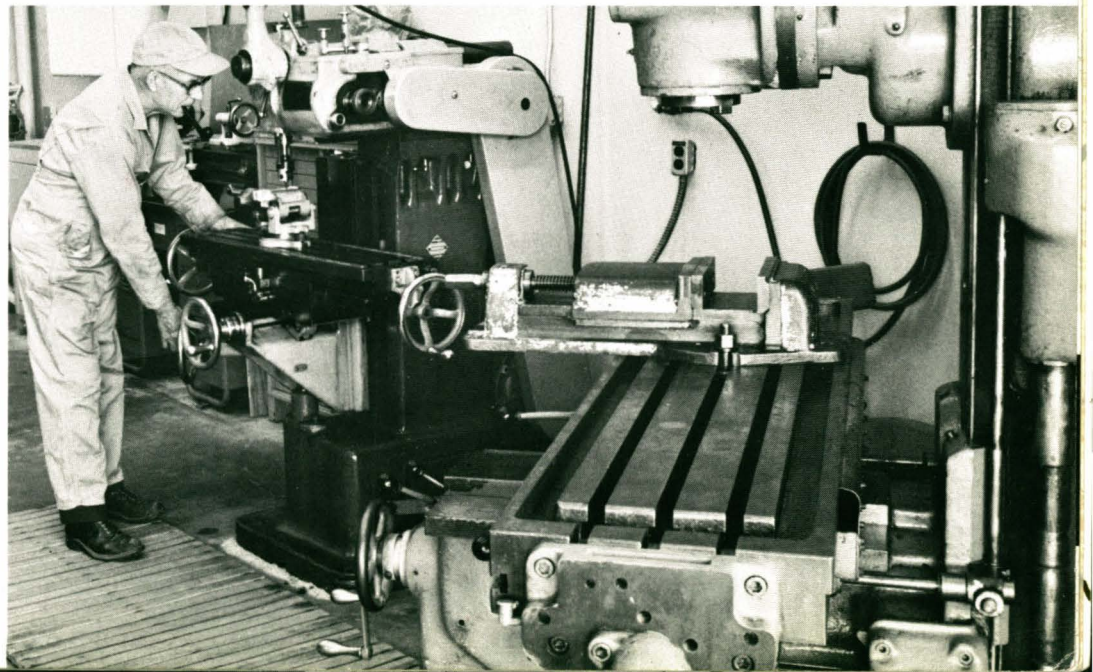


FABRICATION & MACHINE SHOP

The shop is now doing about as much modification as original fabrication. Each year a greater amount of commercial equipment is adaptable because outside industry is beginning to recognize the Forest Service as a worthwhile national market.

The construction or modification of prototype equipment, eventually bound for field testing, is the responsibility of the Center's machine shop. The shop can build required equipment if commercially available units cannot be adapted to meet Forest Service needs. Examples of prototype equipment constructed include a contour furrower, fire tankers, and ground spray system.

The shop can fabricate a broad variety of machinery because of its diversified selection of tools and equipment which includes milling machines, lathes, drill presses, tool grinders, and welding facilities. Operating in conjunction with the machine shop are fabrication, model, and wood shops.



PUBLICATIONS

This group prepares for publication a wide variety of general and special reports which describe equipment developed or evaluated by the Center. It is staffed to handle writing, illustration, and photographic assignments, final layouts, and the preparation of camera-ready copy.

Much of this material is distributed to other Forest Service units, other Government agencies and departments, and outside industries directly concerned with certain projects.

This section is also sometimes called on to prepare training aids and demonstration materials of various kinds, including training films and exhibits.

Included in its facilities are the Center's library of slides, photographic prints, films, and technical journals and a complete photography lab for film processing and print preparation. A full-time professional engineering photographer provides on-the-spot coverage of all project activities and special photographic needs as required.

The personnel and fiscal group attend to the welfare and recognition of the Center's staff by proper job classification and quick servicing of personnel records and pay.

A full-time administrative officer manages the business functions and is available for consultation on matters concerning many phases of financing, purchasing, and other regulatory requirements.

The backbone of any organization is the well-known "clerical force". Of distinct advantage at the Center are the pleasant office surroundings. Also, the variety of work and various kinds of assignments keeps normally routine clerical tasks from becoming commonplace or monotonous.

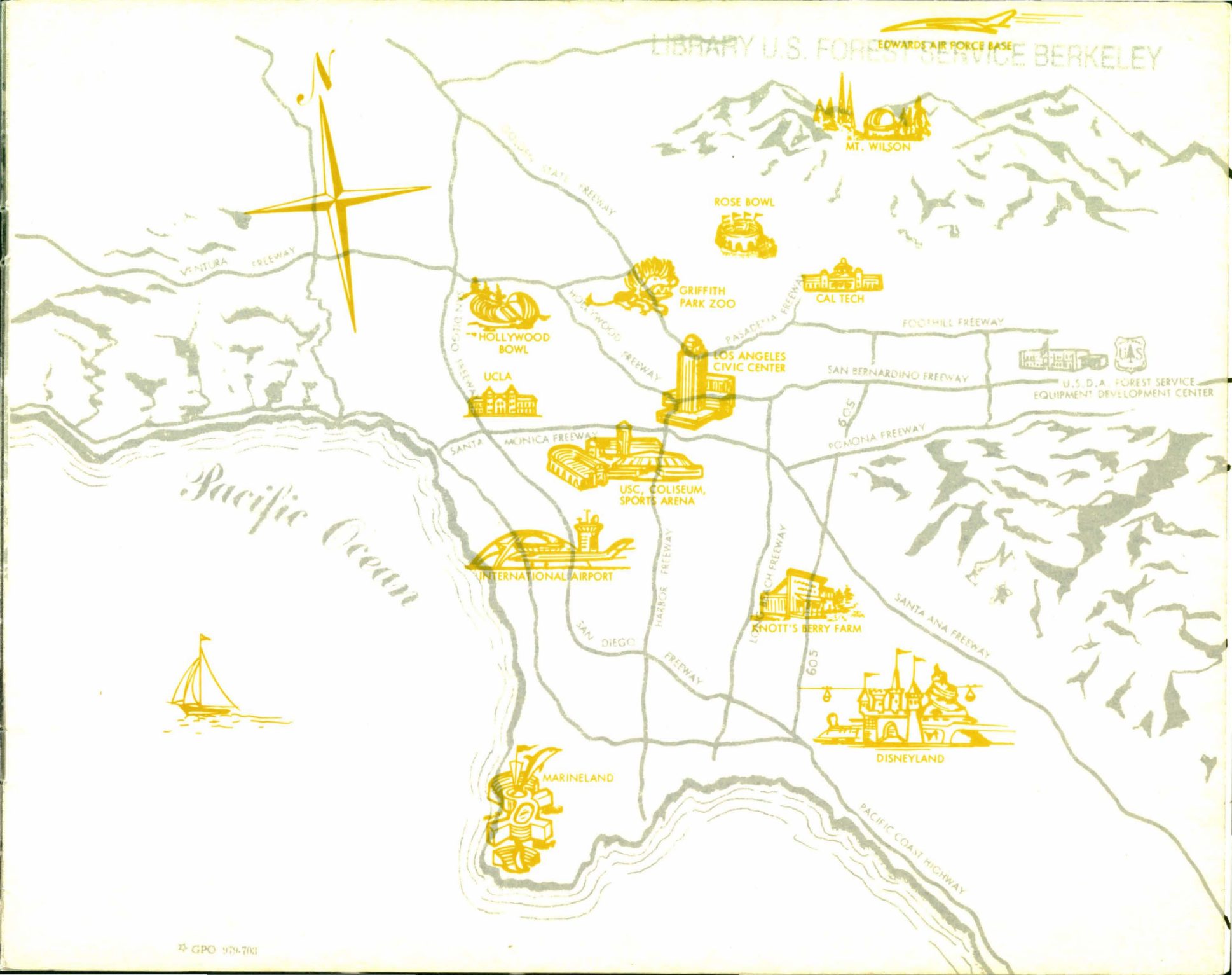
CLERICAL

LOCALITY

The Equipment Development Center occupies a 28-acre tract a few blocks east of the business section of San Dimas. The surrounding area is a happy combination of urban convenience and an almost rural atmosphere.

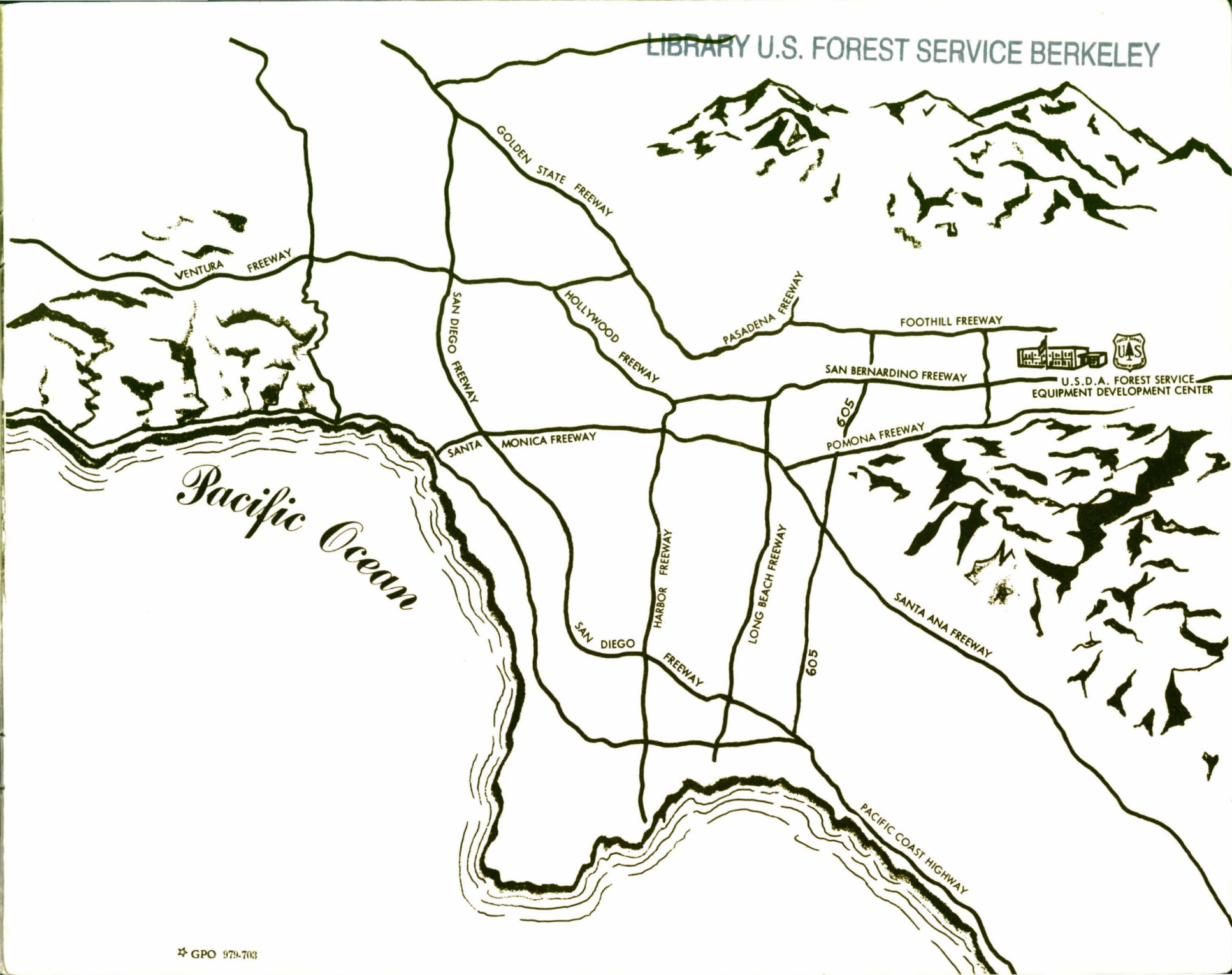
San Dimas – a part of the Los Angeles complex – is not more than an hour's drive from the mountains, the beaches, or the desert. There are a number of colleges within easy driving distance; and the business, recreational, and cultural facilities of Los Angeles are easily accessible.

LIBRARY U.S. FOREST SERVICE BERKELEY



☆ GPO 979-703

LIBRARY U.S. FOREST SERVICE BERKELEY



☆ GPO 979-703

ABOUT THE FOREST SERVICE

As our Nation grows, people expect and need more from their forests - more wood; more water, fish, and wildlife, more recreation and natural beauty; more special forest products and forage. The Forest Service of the U. S. Department of Agriculture helps to fulfill these expectations and needs through three major activities:

Conducting forest and range research at over 75 locations ranging from Puerto Rico to Alaska to Hawaii.

Participating with all State forestry agencies in cooperative programs to protect, improve, and wisely use our Country's 395 million acres of State, local, and private forest lands.

Managing and protecting the 187-million acre National Forest System.

The Forest Service does this by encouraging use of the new knowledge that research scientists develop; by setting an example in managing, under sustained yield, the National Forests and Grasslands for multiple use purposes; and by cooperating with all States and with private citizens in their efforts to achieve better management, protection, and use of forest resources.

Traditionally, Forest Service people have been active members of the communities and towns in which they live and work. They strive to secure for all, continuous benefits from the Country's forest resources.

For more than 60 years, the Forest Service has been serving the Nation as a leading natural resource conservation agency.